MONTANA FISH, WILDLIFE AND PARKS
FISHERIES DIVISION

Lower Boulder Lake & Boulder Creek Restoration Project
Public Draft EA
July 28, 2009

Draft environmental assessment for the application of piscicide to Lower Boulder Lake and Boulder Creek for the purpose of removing Yellowstone cutthroat trout and restocking with westslope cutthroat trout.

PART I: PROPOSED ACTION DESCRIPTION

A. Type of Proposed Action: Montana Fish, Wildlife and Parks (MFWP) proposes to restore native fish to the Boulder Creek watershed, including Lower Boulder Lake and Boulder Creek, through removal of a hybridized Yellowstone cutthroat trout (*Oncorhynchus clarkii bouvieri)* population by applying the piscicide rotenone and restocking the lake and stream with native westslope cutthroat trout (*Oncorhynchus clarkii lewisii)*.

B. Agency Authority for the Proposed Action: 87-1-702. Powers of department relating to fish restoration and management. The department is hereby authorized to perform such acts as may be necessary to the establishment and conduct of fish restoration and management projects as defined and authorized by the act of Congress, provided every project initiated under the provisions of the act shall be under the supervision of the department, and no laws or rules or regulations shall be passed, made, or established relating to said fish restoration and management projects except they be in conformity with the laws of the state of Montana or rules promulgated by the department, and the title to all lands acquired or projects created from lands purchased or acquired by deed or gift shall vest in, be, there remain in the state of Montana and shall be operated and maintained by it in accordance with the laws of the state of Montana. The department shall have no power to accept benefits unless the fish restoration and management projects created or established shall wholly and permanently belong to the state of Montana, except as hereinafter provided.

C. Estimated Commencement Date: This project would commence in late August or early September 2009. MFWP anticipates that a single application of the piscicide rotenone to Lower Boulder Lake and Boulder Creek may not be completely effective at removing the present fish community within this system due to hiding refugia within the lake and creek. Therefore, two piscicide applications may be needed to effectively remove all individuals. If needed, the second piscicide application would occur in the fall of 2010.

D. Name and Location of the Project: This project is referred to as the Lower Boulder Lake and Boulder Creek Restoration Project, and the purpose of the project is to remove Yellowstone cutthroat trout from Lower Boulder Lake and Boulder Creek and restock the lake and creek with westslope cutthroat trout. This project would be conducted within the Boulder Creek watershed located approximately 15 miles southwest of the city of Eureka, Montana. Specifically, Lower Boulder Lake is located within Township 36 North, Range 30 West, Section 35, Lincoln County, Montana (Figure 1), Latitude 48.828 degrees North, Longitude 115.447 degrees West. The US Forest Service manages all the property where the proposed activities would occur.

E. Project Size (acres affected): Lower Boulder Lake has surface area of 6.0 acres and a maximum depth of approximately 13 feet. A small, steep stream connects upper and lower Boulder Lakes, and although the upper lake is fishless, approximately 200 feet of this stream will require treatment to prevent fish in the lower lake from seeking refuge in it. Boulder Creek begins at the outlet of Lower Boulder Lake and flows approximately 8 miles before flowing into Lake Koocanusa. North Fork Boulder Creek contains approximately ¼-mile section of stream capable of supporting fish and will require treatment also.

1. Developed/Residential – 0 acres
2. Industrial – 0 acres
3. Open space/Woodlands/Recreation – 0 acres
4. Wetlands/Riparian –Lower Boulder Lake has a surface area of approximately 6.0 acres, and an approximate maximum depth of 13 feet. A small stream connects the two lakes and is approximately ¼-mile long. Approximately 200 feet of this stream would also be treated with rotenone. Boulder Creek flows out of lower Boulder Lake and flows approximately 8 miles before entering Lake Koocanusa at river mile 255.4 (33.7 miles upstream of Libby Dam).
5. Floodplain – 0 acres
6. Irrigated Cropland – 0 acres
7. Dry Cropland – 0 acres
8. Forestry – 0 acres
9. Rangeland – 0 acres

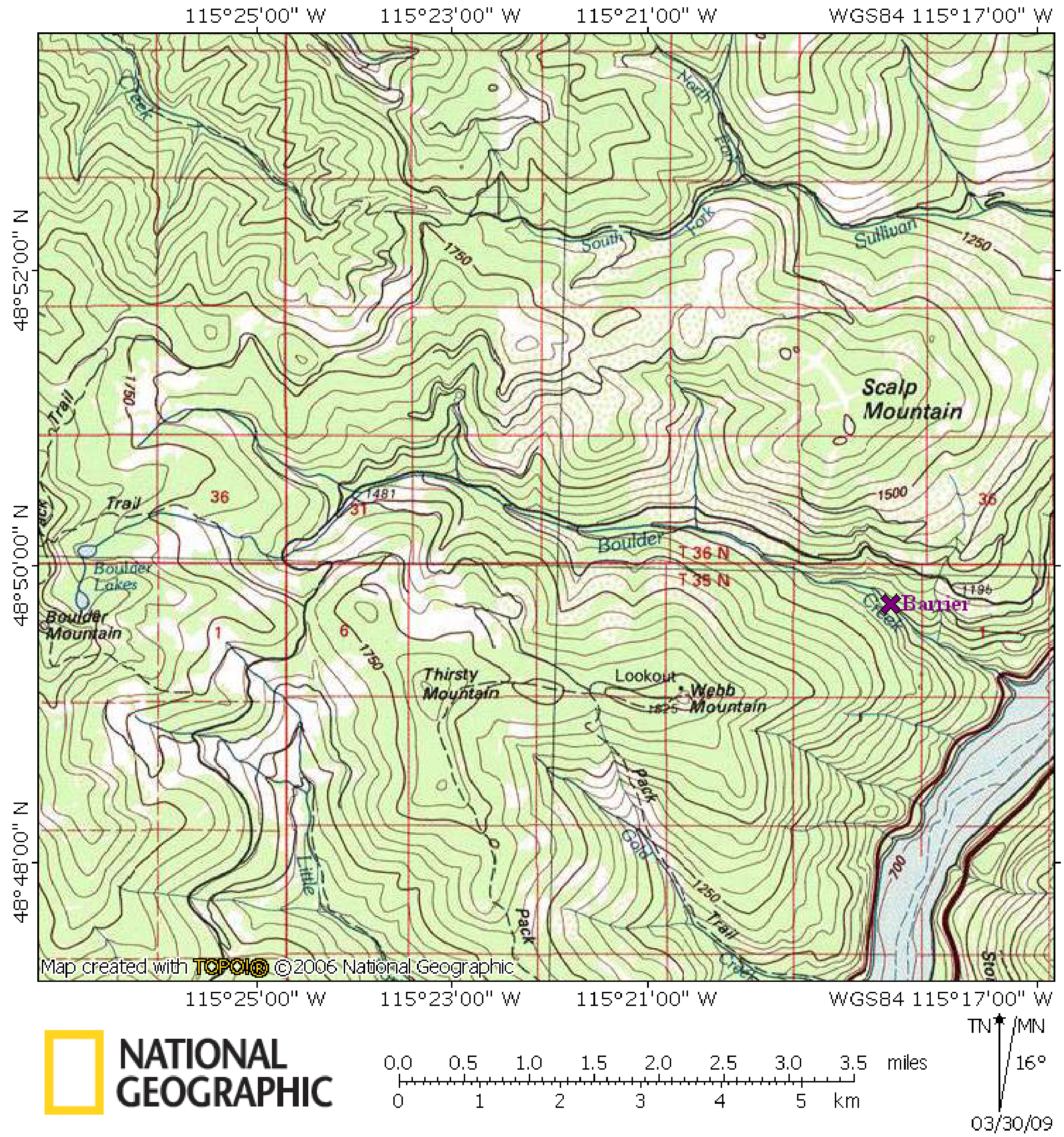

Figure 1. Location of the Lower Boulder Lake and Boulder Creek Restoration project area, located approximately 15 miles southwest of Eureka, Montana.

F. Narrative Summary of the Proposed Action and Purpose of the Proposed Action

Background

Upper and lower Boulder Lakes are located approximately 15 miles southwest of Eureka, Montana, and are accessed from the Boulder Creek Road (USFS Road 337). Upper Boulder Lake has surface area of 6.9 acres and a maximum depth of approximately 10 feet, and lower Boulder Lake has a surface area of 6.0 acres and a maximum depth of approximately 13 feet. Boulder Creek begins at the outlet of Lower Boulder Lake and flows approximately 8 miles across public land (USFS) before flowing into Lake Koocanusa. The Boulder Creek watershed was likely historically fishless due primarily to the presence of a natural falls barrier located approximately 1.7 miles upstream from the Forest Development Road (USFS Road 228). MFWP stocked Upper Boulder Lake in 1953 with an undesignated strain of cutthroat trout, and Lower Boulder Lake was stocked the following year with a similar group of fish. Boulder Creek was stocked with rainbow trout in 1944 and once with an undesignated strain of cutthroat trout in 1946. Upper Boulder Lake is currently fishless, would not require rotenone treatment, and would not be stocked with trout as part of this project. Limited water and steep gradient prevent fish in the lower lake from migrating into the upper lake. Currently, the fish residing in Boulder Creek and Lower Boulder Lake are a hybridized population, with individuals containing characteristics from Yellowstone, westslope cutthroat, and rainbow trout ancestry. Relatively few anglers fish Lower Boulder Lake and Boulder Creek each year. MFWP conducts annual statewide fishing pressure estimates, and a review of these estimates since 1993 found that Lower Boulder Lake appeared only in 2007, with an estimated 37 angler days per year. Boulder Creek was not listed in any of the statewide fishing estimates searched.

Purpose

The objectives of this project are to expand the current distribution within the historic range of westslope cutthroat trout in the Kootenai River Subbasin while continuing to provide angling opportunity within the Boulder Creek watershed. Historically, westslope cutthroat trout were likely the dominant salmonid species in the Montana portion of the Kootenai River Subbasin upstream of the present location of Libby Dam. Today genetically pure populations only exist in the headwater regions of Dodge, Young, and Grave Creeks. This project would expand the distribution of genetically pure westslope cutthroat trout in the Montana portion of the Kootenai watershed upstream of Libby Dam by approximately twenty percent.

Proposed Activities

MFWP would use various formulations of rotenone to remove all fish from Lower Boulder Lake and Boulder Creek and restock these waters with westslope cutthroat trout from the Washoe Park Hatchery in Anaconda. MFWP has a long history of using rotenone to manage fish populations in Montana that spans as far back as 1948. The department has administered rotenone projects for a variety of reasons, but principally to improve angling quality or for native fish conservation. We propose to use CFT Legumine, a commercial formulation that contains 5% rotenone as the active ingredient, as the primary piscicide for this project to remove the hybridized trout from Lower Boulder Lake and Boulder Creek downstream to the existing falls barrier located approximately 1.7 miles upstream from Lake Koocanusa. CFT Legumine acts like other formulations of rotenone act by inhibiting oxygen transfer at the cellular level. It is especially effective at low concentrations with fish because it is readily absorbed into the bloodstream through the thin cell layer of the gills. Mammals, birds, and other nongill-breathing organisms do not have this rapid absorption route into the bloodstream, and thus can tolerate exposure to concentrations much higher than that used to kill fish. Several tributaries enter Boulder Creek between the lakes and the confluence with Lake Koocanusa, and although most of these are not capable of providing suitable habitat due to high gradients, they could provide refuge areas for fish during the treatment near their respective confluences. Therefore, MFWP would also use a dry rotenone gel formulation near the tributary confluence locations to repel fish and keep them from seeking refuge in these areas during treatment. Water flow measurements near the time of treatment would be performed to accurately estimate dilution rates within Boulder Creek as a result of these tributaries. Dry rotenone would be mixed with gelatin and sand into a dough-like consistency, then formed into ‘dough balls’ or placed in containers, such as burlap bags or plastic buckets with holes in them, and placed in the tributaries a short distance upstream. Upper Boulder Lake would not be treated with rotenone or stocked with fish as part of this project. MFWP would conduct electrofishing surveys in Boulder Creek and gillnetting in Lower Boulder Lake to determine if all the hybridized trout were killed. If needed, the second piscicide application would occur in the fall of 2010.

The boundaries for the proposed treatment area include the following water bodies: Lower Boulder Lake, approximately 200 feet of the stream between the upper and lower lakes, and all of Boulder Creek to the confluence with Lake Koocanusa (approximately 8.0 miles). Lower Boulder Lake and Boulder Creek would be treated with CFT Legumine brand 5% rotenone. We would follow the manufacturer’s label recommendations for concentrations for normal pond/lake use when treating the lake, which, for trout, is 0.5-1.0 ppm. On-site assays using caged fish would determine the appropriate concentrations needed, which is estimated to be near 1.0 mg of CFT Legumine per 1 liter of water.

Although there is no domestic use of water within the Boulder Creek watershed, signs would be posted to warn people not to drink the water or to swim immediately after the application of rotenone and not to consume the dead fish.

Lower Boulder Lake has an estimated volume of 31.5 acre-feet (calculated using the TIN method). We would use approximately 10 gallons of CFT Legumine in the lower lake to achieve 1.0 mg/L concentration of rotenone. The persistence of CFT Legumine in the lake would be approximately 4-6 weeks depending on the amount of fresh water entering the lake from the stream, water temperature, sunlight intensity, and alkalinity.

The CFT Legumine would be dispensed in the lake by a small boat. Drip stations would be used to dispense the rotenone in the inlet stream. A drip station is a small container that dispenses a measured amount of liquid rotenone to a stream at a constant rate for a specific period of time. We would apply rotenone to the marshy areas around the lake and to the backwaters of the stream with backpack sprayers. Powdered rotenone would be placed in small burlap bags, then placed at the confluence of the non-fish-bearing tributaries where it would leech into the water. The materials and equipment would be transported to the site by a truck for the treatments of

Boulder Creek, and we would use a helicopter to airlift the boat, motor, and rotenone into Lower Boulder Lake. Drip stations would be calibrated to deliver a rotenone concentration of 1.0 mg of CFT Legumine per 1 liter of water for a 4-8-hour treatment and would be spaced approximately 1.0-3.0 miles apart. Specific spacing and CFT Legumine delivery volumes would be determined prior to treatment using dye tests to determine water travel times and flow (discharge) measurements at each drip station site. Using the criteria described above, we expect the treatment of Boulder Creek may require up to approximately 20 gallons of CFT Legumine. This estimate was calculated assuming a 4-hour treatment with drip stations spaced approximately 1-3 miles apart and stream discharge ranging between 0.3 and 9.0 cubic feet per second. MFWP would use up to approximately 4 kg (8.8 lbs) of powdered rotenone (Prentox 7% rotenone) to treat the confluence areas of the tributaries and springs to prevent fish from seeking them as freshwater refuges during the application.

Boulder Creek originates at the outlet of Lower Boulder Lake at an elevation of 6,040 feet. It flows southeasterly for approximately 8.0 miles before entering Lake Koocanusa at an elevation of 2,483 feet. Boulder Creek is a steep mountain stream with three named tributaries and two unnamed springs. None of the tributaries contain fish due to steep gradient and limited habitat. Boulder Creek from the lake outlet to USFS Road 7183 has an average gradient of 10%. The middle section of Boulder Creek extends from USFS Road 7183 to approximately 2 miles upstream from Lake Koocanusa, has an average gradient ranging between 5-6%, and contains moderate- to high-quality habitat. The 2-mile-long section of Boulder Creek upstream from Lake Koocanusa is very steep (13% average gradient) and flows through a canyon that contains a complete fish barrier to upstream passage.

There are three ways in which rotenone can be detoxified: natural oxidation, dilution by freshwater, and introduction of a neutralizing agent such as potassium permanganate. We would rely on natural detoxification for the lakes, and we would use potassium permanganate to detoxify Boulder Creek (see Comment 2a below). MFWP would use potassium permanganate to detoxify the rotenone added directly to Boulder Creek. We would detoxify Boulder Creek where it crosses the Forest Development Road (USFS Road 228). According to the manufacturer’s label, potassium permanganate should be applied to water at the appropriate concentration to compensate for organic demand of the stream and/or lake bottom so that enough remains to neutralize the rotenone. The detoxification zone is defined as the distance that water in the stream travels in 15 to 30 minutes contact time after the addition of the potassium permanganate. Thus, the detoxification zone for this project is the section of Boulder Creek between the Forest Development Road and Lake Koocanusa. The discharge of Boulder Creek would be measured prior to treatment, and the potassium permanganate would be applied at the rate specified on the manufacturer’s label. On-site assays would be conducted in this stream prior to the treatment to determine the appropriate amount of permanganate necessary to neutralize the rotenone prior to entering Lake Koocanusa.

It may take up to four days to apply the piscicide to the lake and entire stream. The rotenone added to Boulder Creek would not persist for more than approximately 48 hours, but treated lake water would be flowing from the lake for an extended period of time. We expect that once the rotenone added to Boulder Creek is neutralized, the effluent from Lower Boulder Lake would be sufficiently diluted, and any residual rotenone would be neutralized prior to entering Lake

Koocanusa. Nevertheless, we operate the detoxification station at the Forest Development Road (USFS Road 228) crossing until sentinel fish survive and show no signs of stress in the outlet stream for 4 hours as specified by the label.

Caged cutthroat trout would be used to measure the toxicity of the water in the lake and creek to ensure the objectives are met. After the piscicide application, we would use caged fish to evaluate when the waters are no longer toxic to fish and when fish can be restocked. The rotenone label specifies that once caged fish survive 24 hours in treated lake water, it is considered detoxified and is safe for restocking. The label also states that if sentinel fish in treated stream water show no signs of distress within 4 hours, the stream water is considered no longer toxic, and detoxification can be discontinued.

Dead fish that surface would be left on-site in the water or disposed of properly. Studies in Washington State indicate that approximately 70% of rotenone-killed fish in lake treatments sink to the bottom (Bradbury 1986). Dead fish stimulate plankton growth and aid in plankton recovery.

A single application of rotenone may not kill all the fish within the project area due to the multiple small tributaries and hiding refugia present within the watershed. Therefore, this project may require multiple rotenone applications to achieve project objectives. After the first rotenone treatment, we would evaluate its effectiveness via gillnetting and electrofishing surveys and use the information from these surveys to evaluate the need for an additional treatment. If fish are captured and a second treatment is required, we would likely complete the second treatment in early fall of 2010. In the event that a second treatment is necessary, the same measures and precautions used during the first treatment would be applied to the second treatment, and unless environmental conditions change substantially prior to the second treatment, a second environmental assessment would not be conducted.

Monitoring is an important component of this type of management activity (Meronek et al. 1996). By way of example, MFWP conducted extensive monitoring of the 2005 rotenone treatment of Martin Creek and Martin Lakes near Olney. The results indicate the stream naturally detoxified with dilution from freshwater within 48 hours. This treatment was contained within the specified boundaries by detoxification with potassium permanganate and dilution by freshwater. Martin Lakes were treated with 1.17 ppm Prenfish rotenone. Although very little freshwater was flowing into the lakes, the water was no longer toxic to fish after 44 days (Schnee 2006). Plankton blooms occurred in Martin Lakes 160 days after the treatment. Columbia spotted frogs were observed depositing eggs in Martin Lakes the following spring. In 2006, Blue Lake near Stryker was treated with 1.5 ppm Prenfish rotenone, and the lake naturally detoxified in 77 days (Schnee 2007a). MFWP has extensive experience conducting this type of monitoring, and we would employ a similar strategy for this project. (See Comment 5c about monitoring)

Lower Boulder Lake and Boulder Creek would be restocked with westslope cutthroat trout during the summer of 2010 if a single application achieves project objectives, and if a second treatment is required, stocking would occur during the summer of 2011. The fish would likely come from the Washoe State Hatchery in Anaconda and would be age 0 westslope cutthroat trout. We plan to annually stock approximately 1,000 fry into the lakes and 1,000 fry into

Boulder Creek for 3 years. We may also evaluate using remote site incubators to stock westslope cutthroat trout eggs in Boulder Creek, pending availability of the eggs and efficacy of the fry plants to reestablish the trout population in Boulder Creek. We plan to use electrofishing surveys in Boulder Creek and gillnetting in Lower Boulder Lake to evaluate growth and relative survival of the hatchery fish.

Funding

The piscicide application and monitoring portions of this project are funded through the Libby Mitigation, which receives funding from the Bonneville Power Administration. This environmental assessment will be used as a supplemental analysis for the Programmatic EIS used to fulfill the NEPA requirements for the Bonneville Power Administration. Funding for fish stocking will be provided from the other MFWP funding sources.

PART II. ENVIRONMENTAL REVIEW

A. PHYSICAL ENVIRONMENT

1. <u>LAND RESOURCES</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Soil instability or changes in geologic substructure?		X				
b. Disruption, displacement, erosion, compaction, moisture loss, or over-covering of soil, which would reduce productivity or fertility?		X				
c. Destruction, covering, or modification of any unique geologic or physical features?		X				
d. Changes in siltation, deposition, or erosion patterns that may modify the channel of a river or stream or the bed or shore of a lake?		X				
e. Exposure of people or property to earthquakes, landslides, ground failure, or other natural hazard?		X				

2. **WATER** **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Discharge into surface water or any alteration of surface water quality including but not limited to temperature, dissolved oxygen or turbidity?			X		YES	2a
b. Changes in drainage patterns or the rate and amount of surface runoff?		X				
c. Alteration of the course or magnitude of floodwater or other flows?		X				
d. Changes in the amount of surface water in any water body or creation of a new water body?		X				
e. Exposure of people or property to water-related hazards such as flooding?		X				
f. Changes in the quality of groundwater?		X				2f
g. Changes in the quantity of groundwater?		X				
h. Increase in risk of contamination of surface or groundwater?			X		YES	See 2a & 2f
i. Effects on any existing water right or reservation?		X				
j. Effects on other water users as a result of any alteration in surface or groundwater quality?		X				See 2j
k. Effects on other users as a result of any alteration in surface or groundwater quantity?		X				
l. Will the project affect a designated floodplain?		X				
m. Will the project result in any discharge that will affect federal or state water quality regulations? (Also see 2a)			X		YES	2m

Comment 2a: The proposed project is designed to intentionally introduce a pesticide to surface water to remove hybridized nonnative fish. The impacts would be short term and minor. CFT Legumine 5% liquid) and Prentox (7% powder) rotenone are EPA-registered pesticides and are safe to use for removal of unwanted fish, when handled properly. The concentration of these products proposed is 1.0 mg per 1 liter of water, but could be adjusted within the label-allowed limits based upon the results of on-site assays.

There are three ways in which rotenone can be detoxified once applied. The most common method is to allow natural breakdown to occur. Rotenone is a compound that is susceptible to natural breakdown (detoxification) through a variety of mechanisms such as water chemistry, water temperature, exposure to organic substances, exposure to air, and sunlight intensity (Ware 2002; ODFW 2002; Loeb and Engsrtom-Heg 1970; Engstrom-Heg 1972; Gilderhus et al. 1986). Rotenone persistence studies by Gilderhus et al. (1986) and Dawson et al. (1991) found that in cool water temperatures of 32 to 46^{o}F the half-life ranged from 3.5 to 5.2 days. Gilderhus et al. (1986) reported that 30% mortality was experienced in rainbow trout exposed to degrading concentrations of actual rotenone (0.004 ppm) in 46^{o}F pond water 14 days after a treatment. By day 18 the concentrations were sublethal to trout. The second method for detoxification involves basic dilution by fresh water. This may be accomplished by fresh ground water or surface water flowing into a lake or stream. The final method of detoxification involves the application of an oxidizing agent like potassium permanganate. This dry crystalline substance is mixed with stream or lake water to produce a concentration of liquid sufficient to detoxify the rotenone. Detoxification is accomplished after about 15-30 minutes of exposure time between the two compounds (Prentiss Inc. 1998, 2007).

MFWP will use potassium permanganate to detoxify the rotenone added directly to Boulder Creek. MFWP will detoxify Boulder Creek where it crosses the Forest Development Road (USFS Road 228). The detoxification zone for this project is the section of Boulder Creek between Forest Development Road and Lake Koocanusa, and MFWP expects Boulder Creek to detoxify within 48 hours after the drip stations are removed. The discharge of Boulder Creek will be measured at several locations within 1-2 weeks prior to treatment so that potassium permanganate application rates can be more closely determined at rates specified on the manufacturer's label, and dilution rates can be estimated. On-site assays would be conducted in this stream prior to the treatment to determine the appropriate amount of permanganate necessary to neutralize the rotenone prior to entering Lake Koocanusa. MFWP expects that once the rotenone added to Boulder Creek is neutralized, the effluent from Lower Boulder Lake would be sufficiently diluted, and any residual rotenone would be neutralized prior to entering Lake Koocanusa. Nevertheless, MFWP will operate the detoxification station at the Forest Development Road (USFS Road 228) crossing until sentinel fish survive and show no signs of stress in the outlet stream for 4 hours as specified by the label. MFWP expects Lower Boulder Lake to detoxify within 4 to 6 weeks.

Dead fish would result from this project. Bradbury (1986) reported that approximately 70% of rotenone fish killed in Washington lakes never surface. Although no trout were involved with his study, Parker (1970) reported that at water temperatures of 40^{o}F and less, dead fish required 20-41 days to surface. The most important factors inhibiting fish from ever surfacing are cooler water (<50^{o}F) and deep water (>15 feet). Lower Boulder Lake has a maximum depth of approximately 13 feet, and surface temperatures of these lakes at the time of treatment are expected to be slightly warmer than 50^{o}F, so MFWP expects that more fish may surface in these lakes than Bradbury (1986) observed. Bradbury (1986) also reported that 9 of 11 water bodies in Washington treated with rotenone experienced an algae bloom shortly after treatment. This is attributed to the input of phosphorus to the water as a result of decaying fish. Bradbury further notes that approximately 70% of the phosphorus content of the fish stock would be released into the lake through bacterial decay. This action stimulates phytoplankton production, then zooplankton production, and starts the lake toward production of food for fish. This change in water chemistry is viewed as a benefit to stimulate plankton growth. Any changes or impacts to water quality resulting from decaying fish would be short term and minor.

Comment 2f: No contamination of groundwater is anticipated to result from this project. Lower Boulder Lake and Boulder Creek are primarily fed by ground water and snowmelt. Therefore, MFWP doesn't anticipate the treated surface waters to enter the aquifer. However, if rotenone-treated water does enter the aquifer within the watershed, MFWP doesn't expect it would have any negative impacts. Rotenone binds readily to sediments and is broken down by soil and in water (Skaar 2001; Engstrom-Heg 1971, 1976; Ware 2002). Rotenone moves only one inch in most soil types; the only exception would be sandy soils where movement is about three inches (Hisata 2002). In California, studies where wells were placed in aquifers adjacent to and downstream of rotenone applications have never detected rotenone, rotenolone, or any of the other organic compounds in the formulated products (CDFG 1994). Case studies in Montana have concluded that rotenone movement through groundwater does not occur. For example, at Tetrault Lake, Montana, neither rotenone nor inert ingredients were detected in a nearby domestic well, which was sampled two and four weeks after applying 90 ppb rotenone to the lake. This well was chosen because it was down gradient from the lake and also drew water from the same aquifer that fed and drained the lake. In 1998, a Kalispell-area pond was treated with Prenfish 5% rotenone. Water from a well located 65 feet from the pond was analyzed, and no sign of rotenone was detected. In 2001, another Kalispell-area pond was treated with Prenfish 5% rotenone. Water from a well located 200 feet from that pond was tested four times over a 21-day period and showed no sign of contamination. In 2005, MFWP treated a small pond near Thompson Falls with Prenfish to remove pumpkinseeds and bass. A well that was located 30 yards from the pond was tested and neither Prenfish nor inert ingredients were found in the well.

Inert ingredients in CFT Legumine volatilize rapidly in the environment by both photolysis and hydrolysis and therefore do not pose a threat to the environment at the levels proposed for fish eradication.

Comment 2j: The CFT Legumine label states "….Do not use water treated with rotenone to irrigate crops or release within 1/2 mile upstream of a potable water or irrigation water intake in a standing body of water such as a lake, pond, or reservoir…" There are no irrigation or potable water intakes in the Boulder Creek watershed, and the entire project will occur on public land administered by the US Forest Service.

Comment 2m: MFWP would apply for an exemption of surface water quality standards for the purpose of applying a pesticide from Montana DEQ under Section 308 of the Montana Water Quality Act.

3. AIR **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Emission of air pollutants or deterioration of ambient air quality? (also see 13 (c))			X			3a
b. Creation of objectionable odors?			X		yes	3b
c. Alteration of air movement, moisture, or temperature patterns or any change in climate, either locally or regionally?		X				
d. Adverse effects on vegetation, including crops, due to increased emissions of pollutants?		X				
e. Will the project result in any discharge which will conflict with federal or state air quality regs?		X				

Comment 3a: This project will use a small boat and outboard motor to dispense the CFT Legumine in Lower Boulder Lake, which will create emissions, but the emissions are expected to dissipate rapidly. Any impacts from these odors would be short term and minor.

Comment 3b: CFT Legumine does not contain the same level of aromatic petroleum solvents (toluene, xylene, benzene, and naphthalene) of other rotenone formulations and as a consequence does not have the same odor concerns and has less inhalation risks. Dead fish would result from this project and may cause objectionable odors. This condition is greatly reduced during fall applications. Collecting and/or sinking dead fish in Lower Boulder Lake and Boulder Creek would mitigate this. MFWP expects any odors from dead fish to be short term and minor (see Comment 2a).

4. VEGETATION **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Changes in the diversity, productivity or abundance of plant species (including trees, shrubs, grass, crops, and aquatic plants)?			X			4a
b. Alteration of a plant community?		X				
c. Adverse effects on any unique, rare, threatened, or endangered species?		X				
d. Reduction in acreage or productivity of any agricultural land?		X				
e. Establishment or spread of noxious weeds?		X				
f. Will the project affect wetlands, or prime and unique farmland?		X				

Comment 4a: Boulder Lakes and Boulder Creek are located in a forested area. Access to Boulder Lakes is from a trail, and access to Boulder Creek is somewhat limited along USFS Road 337. There may be minor trampling of vegetation around the lakes and creek during the rotenone application and stream during the placement and monitoring of drip stations and sentinel fish. Rotenone does not have an effect on plants at concentrations used to kill fish. Impacts from trampling vegetation are expected to be short term and minor.

5. **<u>FISH/WILDLIFE</u>** **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Deterioration of critical fish or wildlife habitat?		X				
b. Changes in the diversity or abundance of game animals or bird species?			X		yes	5b
c. Changes in the diversity or abundance of nongame species?			X		yes	5c
d. Introduction of new species into an area?			X			5d
e. Creation of a barrier to the migration or movement of animals?		X				
f. Adverse effects on any unique, rare, threatened, or endangered species?			X			5f
g. Increase in conditions that stress wildlife populations or limit abundance (including harassment, legal or illegal harvest, or other human activity)?		X				5g
h. Will the project be performed in any area in which T&E species are present, and will the project affect any T&E species or their habitat? (Also see 5f)		X				
i. Will the project introduce or export any species not presently or historically occurring in the receiving location? (Also see 5d)			X			See 5d

Comment 5b: This project is designed to kill unwanted fish. This project is designed to kill trout that consist of hybridized Yellowstone and westslope cutthroat trout. These fish are designated as a game species that would be eliminated from Lower Boulder Lake and Boulder Creek. The impact from the removal of these fish is expected to be short term and minor because the lake and creek would be restocked with westslope cutthroat trout. However, the fish stocking strategy MFWP anticipates using for this project will utilize mostly fry. Therefore, it may take several years for the stocked hatchery trout to grow to catchable size in both the creek and lake. This may result in a short term loss of angling opportunity in these waters.

Comment 5c:

Aquatic Invertebrates: Numerous studies indicate that rotenone has temporary or minimal effects on aquatic insects and plankton. Anderson (1970) reported that comparisons between samples of zooplankton taken before and after a rotenone treatment did not change a great deal. Despite the inherent natural fluctuations in zooplankton communities, the application of rotenone had little effect on the zooplankton community. Cook and Moore (1969) reported that the application of rotenone has little lasting effect on the nontarget insect community of a stream. Kiser et al. (1963) reported that 20 of 22 zooplankton species reestablished themselves to pretreatment levels within about 4 months of a rotenone application. Cushing and Olive (1956) reported that the insects in a lake treated with rotenone exhibited only short-lived effects. Hughey (1975) concluded that three Missouri ponds treated with rotenone showed little short-term and no long-term effect on population levels of zooplankton. The effects of rotenone on plankton were consistent with the natural variability that is characteristic of plankton populations, and recolonization was rapid and reached near pretreatment levels within 8 months.

Both Anderson (1970) and Kiser et al. (1963) reported that most zooplankton species survive a rotenone treatment via their highly resilient egg structures. In addition, parthenogenesis of some female plankton occurs, causing sexual dimorphism, which greatly increases plankton density in times of population distress. Among the aforementioned studies, variation in climate, physical environment, and water chemistry would likely cause subtle differences in results in other areas.

Case studies conducted on Devine Lake in the Bob Marshall Wilderness from 1994-1996 indicate that invertebrates actually increased in number and very slightly increased in diversity following a rotenone treatment (Rumsey et al. 1996). This is supported by observations made by Cushing and Olive (1956), who reported that oligochaetes (worms) increased in number after a rotenone treatment, then became stable. *Gammarus* species (fresh water shrimp), a common fish food item, were detected in Devine Lake only when fish were present. Neighboring Ross Lake, in the Bob Marshall Wilderness, is fishless and was used to measure natural insect and plankton variation during the Devine Lake treatment and evaluation. *Gammarus* species were never detected in Ross Lake, although it is fishless. Invertebrate numbers in Ross Lake were reported to be relatively stable, but the diversity of insects fluctuated considerably over time. Many studies report that aquatic insects are much less sensitive to rotenone treatment than fish (Schnick 1974). Houf and Campbell (1977) reported no short-term or long-term effects on species abundance or insect emergence in three ponds treated with 0.5 to 2.0 mg/L of Noxfish 5% rotenone. In a study on the relative tolerance of different aquatic invertebrates to rotenone, Engstrom-Heg et al. (1978) reported that the long-term impacts of rotenone are mitigated because those insects that were most sensitive to rotenone also tended to have the highest rate of recolonization. Aquatic invertebrates in general are capable of rapid recovery from disturbance (Matthaei et al. 1996).

In regard to zooplankton, Schnee (2007b) chronicled two years of post rotenone treatment monitoring for upper and lower Martin Lakes near Olney, Montana, that were treated in 2005. He concluded that zooplankton density two years after the treatment were similar to pretreatment densities, and in some cases higher (see tables below). Zooplankton community composition showed no change between 2006 and 2007. Based on this, MFWP would expect the plankton species composition in Lower Boulder Lake to return to pretreatment diversity and abundance within two years.

Upper Martin Lake near Olney, MT:

2005 (pretreatment)		**2006 (posttreatment)**		**2007 (posttreatment)**	
Date Sampled	Quantity/liter	Date Sampled	Quantity/liter	Date Sampled	Quantity/liter
May	No sample	18-May-06	0.03	10-May-07	16.50
16-Jun-05	24.70	16-Jun-06	0.85	11-Jun-06	19.78
21-Jul-05	5.67	10-Jul-06	19.15	July	No sample
06-Aug-05	8.63	16-Aug-06	9.77	August	No sample
03-Oct-05	4.70	18-Oct-06	4.75	5-Oct-07	10.82

Lower Martin Lake near Olney, MT:

2005 (pretreatment)		**2006 (posttreatment)**		**2007 (posttreatment)**	
Date Sampled	Quantity/liter	Date Sampled	Quantity/liter	Date Sampled	Quantity/liter
May	No sample	18-May-06	0.40	10-May-07	24.40
16-Jun-05	24.19	16-Jun-06	3.76	11-Jun-06	27.47
21-Jul-05	17.82	10-Jul-06	7.46	July	No sample
06-Aug-05	24.60	16-Aug-06	15.43	August	No sample
03-Oct-05	7.71	18-Oct-06	8.46	5-Oct-07	25.72

Schnee (2007b) concluded that that rotenone's effects on nontarget organisms such as plankton, amphibians, reptiles, and aquatic insects were temporary, and natural reproduction and/or recolonization by these species was sufficient to restore populations to pretreatment densities within two years.

Amphibians and Reptiles: MFWP observed spotted frogs (*Rana pretiosa*) and long-toed salamanders (*Ambystoma macrodactylum*) within the project area. Other amphibian species, which may be present on the project area, include western toads (*Bufo boreas*) and Pacific chorus frogs (*Pseudacris regilla*). Western terrestrial garter snakes (*Thamnophis elegans*), common garter snakes (*Thamnophis sirtalis*), and racer snakes (*Coluber constrictor*) likely inhabit the project area and are within the known distribution range of the area, as are painted turtles (*Chrysemys picta*), rubber boa snakes (*Charina bottae*), western skinks (*Eumeces skiltonianus*), and northern alligator lizards (*Elgaria coerulea*). However, MFWP has not observed any of these species in the vicinity of the project area.

Rotenone is toxic to most gill-breathing larval amphibians, but is not harmful to adults (Schnick 1974). Chandler and Marking (1982) found that southern leopard frog tadpoles were between 3 and 10 times more tolerant than fish to Noxfish (5% rotenone formulation). Grisak et al. (in prep) conducted laboratory studies on long-toed salamanders, tailed frogs, and Columbia spotted frogs and concluded that the adult life stages of these species would not suffer an acute response to rotenone, but the larval and tadpole stages could be affected by rotenone at fish-killing concentrations. These authors recommended implementing rotenone treatments at times when the larvae and tadpoles are not present, such as the late summer/early fall (which is the case in this project), to reduce potential for impacts.

Chandler and Marking (1982) found that clams and snails were between 50 and 150 times more tolerant than fish to Noxfish (5% rotenone formulation), and Southern Leopard frog tadpoles were between 3 and 10 times more tolerant than fish. Grisak et al. (2007) conducted laboratory studies on long-toed salamanders, Rocky Mountain tailed frogs, and Columbia spotted frogs and concluded that the adults of these species would not suffer an acute response to Prenfish at trout killing concentrations (0.5-1 mg/L), but the larvae would likely be affected. These authors recommended implementing rotenone treatments at times when the larvae are not present, such as the fall, to reduce the chance of exposure to rotenone-treated water and potential impacts to larval amphibians.

It is important to note that many toxicity studies involve subjecting laboratory specimens to unusually high concentrations of rotenone or conducting tests on animals that would not normally be exposed to rotenone during use in fisheries management.

Based on this information MFWP would expect the impacts to nontarget organisms to range from nonexistent to short term and minor.

Mammals and Birds: Mammals are generally not affected because they neutralize rotenone by enzymatic action in their stomach and intestines (AFS 2002). Laboratory tests by Marking (1988) fed forms of rotenone to rats and dogs as part of their diet for periods of six months to two years and observed effects such as diarrhea, decreased food consumption, and weight loss. He reported that despite unusually high treatment concentrations of rotenone in rats and dogs, it did not cause tumors or reproductive problems in mammals. Studies of risk for terrestrial animals found that a 22-pound dog would have to drink 7,915 gallons of treated lake water within 24 hours, or eat 660,000 pounds of rotenone-killed fish, to receive a lethal dose (CDFG 1994). The state of Washington reported that a half-pound mammal would need to consume 12.5 mg of pure rotenone to be receiving a lethal dose (Bradbury 1986). Considering the only conceivable way an animal can consume the compound under field conditions is by drinking lake or stream water, a half-pound animal would need to drink 33 gallons of water treated at 2 ppm.

The EPA (2007) made the following conclusion for small and large mammals:

> *When estimating daily food intake, an intermediate-sized 350 g mammal will consume about 18.8 g of food. Using data previously cited from the common carp with a body weight of 88 grams, a small mammal would only consume 21% (18.8/88) of the total carp body mass. According to the data for common carp, total body residues of rotenone in carp amounted to 1.08 µg/g. A 350-g mammal consuming 18.8 grams represents an equivalent dose of 20.3 µg of rotenone; this value is well below the median lethal dose of rotenone (39.5 mg/kg * 0.350 kg = 13.8 mg = 13,800 µg) for similarly sized mammals. When assessing a large mammal, 1000 g is considered to be a default body weight. A 1000 g mammal will consume about 34 g of food. If the animal fed exclusively on carp killed by rotenone, the equivalent dose would be 34 g *1.08 µg/g or 37 µg of rotenone. This value is below the estimated median lethal equivalent concentration adjusted for body weight (30.4 mg/kg * 1 kg = 30.4 mg = 30,400 µg). Although fish are often collected and buried to the extent possible following a rotenone treatment, even if fish were available for consumption by mammals scavenging along the shoreline for dead or dying fish, it is unlikely that piscivorous mammals will consume enough fish to result in observable acute toxicity.*

One study, in which rats were injected with rotenone for a period of weeks, reported finding lesions characteristic of Parkinson's disease (Betarbet et al. 2000). However, the results have been challenged on the basis of methodology: (1) that the continuous intravenous injection method used leads to "continuously high levels of the compound in the blood," and (2) that dimethyl sulfoxide (DMSO) was used to enhance tissue penetration (normal routes of exposure actually slow introduction of chemicals into the bloodstream). Finally, injecting rotenone into the body is not a normal way of assimilating the compound. Similar studies (Marking 1988) have found no Parkinson-like results. Extensive research has demonstrated that rotenone does not cause birth defects (HRI 1982), gene mutations (Van Geothem et al. 1981; BRL 1982), or cancer (Marking 1988). Rotenone was found to have no direct role in fetal development of rats that were fed excruciatingly high concentrations of rotenone. Spencer and Sing (1982) reported that rats that were fed diets laced with 10-1,000 ppm rotenone over a 10-day period did not suffer any reproductive dysfunction. Typical concentrations of actual rotenone used in fishery management range from 0.025 to 0.50 ppm and are far below that administered during most toxicology studies.

Similar results determined that birds required levels of rotenone at least 1,000- to 10,000-times greater than is required for lethality in fish (Skaar 2001). Cutkomp (1943) reported that chickens, pheasants, and members of lower orders of *Galliformes* were quite resistant to rotenone, and 4-day-old chicks were more resistant than adults. Ware (2002) reports that swine are uniquely sensitive to rotenone and it is slightly toxic to wildfowl, but to kill Japanese quail required 4,500- to 7,000-times more than is used to kill fish.

The EPA (2007) made the following conclusion for birds:

> *Since rotenone is applied directly to water, there is little likelihood that terrestrial forage items for birds will contain rotenone residues from this use. While it is possible that some piscivorous birds may feed opportunistically on dead or dying fish located on the surface of treated waters, protocols for piscicidal use typically recommend that dead fish be collected and buried, rendering the fish less available for consumption (see Section IV). In addition, many of the dead fish will sink and not be available for consumption by birds. However, whole body residues in fish killed with rotenone ranged from 0.22 µg/g in yellow perch (Perca flavescens) to 1.08 µg/g in common carp (Cyprinus carpio) (Jarvinen and Ankley 1998). For a 68 g yellow perch and an 88 g carp, this represents totals of 15 µg and 95 µg rotenone per fish, respectively. Based on the avian subacute dietary LC_{50} of 4110 mg/kg, a 1000-g bird would have to consume 274,000 perch or 43,000 small carp. Thus, it is unlikely that piscivorous birds will consume enough fish to result in a lethal dose.*

It is important to note that nearly all of these examples presented here involved subjecting laboratory specimens to unusually high concentrations of rotenone or conducting tests on animals that would not be exposed to rotenone during normal use in fisheries management.

Based on the above information, MFWP would expect the impacts to nontarget mammals and birds to range from nonexistent to short term and minor. These impacts may include temporary displacement during the recolonization of plankton and aquatic insect communities.

MFWP will assess the long-term environmental impacts of this project on the nontarget aquatic organisms in Boulder Creek at a limited number of sites before and after project completion. Insect samples will be collected from Boulder Creek at 3-5 locations that are representative of stream habitat during the summer of 2009 prior to treatment. The same sites will be sampled for two consecutive years following the last rotenone treatment to compare changes in the benthic community. In addition, MFWP will also complete at least one day of survey before the treatment describing the status of other nontarget organisms in the project area such as birds, amphibians, and mammals within the Boulder Creek watershed. After the treatment is completed, the surveys will be repeated the following two years. MFWP will also evaluate changes in the zooplankton community in Lower Boulder Lake that result from this project. Zooplankton samples will be conducted in Lower Boulder Lake prior to rotenone treatment using a Wisconsin net in the deepest part of the lake. The zooplankton surveys will also be repeated for two consecutive years following the last rotenone treatment. Pre- and posttreatment analyses will include comparisons of numbers of zooplankton and comparisons to the taxanomic level of genera.

Comment 5d: This project is designed to replace the existing hybridized Yellowstone cutthroat trout in Lower Boulder Lake and Boulder Creek with westslope cutthroat trout and will require stocking hatchery fish to accomplish this objective. Hatchery westslope cutthroat trout will be stocked the following summer after the last rotenone treatment. Approximately 1,000 cutthroat fry will be stocked in Lower Boulder Lake, and 1,000 fry will also be stocked in Boulder Creek. MFWP may also stock westslope cutthroat trout eggs in Boulder Creek to facilitate reestablishing a self-sustaining population within the creek. The stocking of Boulder Creek will not continue once a self-sustaining population is reestablished in Boulder Creek. However, maintenance stocking of the lakes may be considering depending on monitoring results that evaluate fish performance and angler use. Although the Boulder Creek watershed is believed to be historically fishless upstream of the natural falls barrier located approximately 1.7 miles upstream from Lake Koocanusa, MFWP previously stocked both the creek and the lakes.

Comment 5f: Bull trout are listed as a threatened species, but do not occur in Boulder Creek or Boulder Lakes. However, bull trout do reside in Lake Koocanusa. MFWP will operate the detoxification station at the intersection of USFS Road 228, which is located approximately 0.1 miles upstream from the confluence of Lake Koocanusa. In the unlikely event that the detoxification operation is not effective at neutralizing all the rotenone added to Boulder Creek, it is possible that some bull trout in the immediate vicinity of the Boulder Creek confluence may be killed. However, the potential for any such impacts is low. MFWP bases this assumption on the following facts. The immense capacity of Lake Koocanusa will dilute any rotenone that has not been neutralized and contain the potential impact zone to a relatively small area in the immediate vicinity of the Boulder Creek confluence area. This project will be conducted in late summer/early fall, a time period when most adult bull trout will have already migrated to their respective spawning tributaries. The nearest known spawning tributary is Grave Creek, a tributary to the Tobacco River, which is 11.4 miles up the reservoir from the confluence of Boulder Creek. MFWP expects that the detoxification operation will only be needed for approximately 48 hours, a relatively short time period, which should further reduce the opportunity for mishaps during the detoxification operation. Therefore, MFWP anticipates that this project will have minor-to-nonexistent impact on bull trout populations located upstream of Libby Dam.

Bald eagles were federally delisted on June 28, 2007, but MFWP still considers them a sensitive species because they are one of the birds most likely to consume fish killed by rotenone. There are no known bald eagle nests in the Boulder Creek watershed. However, bald eagles and ospreys are relatively common on Lake Koocanusa. It is possible that osprey or eagles would forage on rotenone-killed fish that result from this project. However, conducting this project in the fall would not impact bald eagle nesting, and there would be no impacts to bald eagles that consume rotenone-killed fish. Lower Boulder Lake and Boulder Creek would be restocked with fish the following year, so there would be no impacts to bald eagles. See Comment 5c for impacts to birds.

Grizzly bears are known to be in this area, but are not dependant on the lake or fish in the lakes or creek for food. The infrequent sighting of grizzly bears, and human activity in the area, would contribute to reducing potential for this species to consume fish killed by rotenone. See Comment 5c for impacts to mammals. The project would not have an impact on grizzly bears.

The project site is within the range of the gray wolf. However, gray wolves are not dependant on the lakes or stream or fish in the lakes or stream for food. The impacts to this species would be nonexistent for the same reasons as the grizzly bear. See Comment 5c for impacts to mammals.

MFWP did not observe any common loons at Lower Boulder Lake during our surveys; however, it is possible that loons may occasionally use the lake for foraging. There may be a short-term and minor impact to loons that use Lower Boulder Lake for feeding on fish. Loons may be temporarily displaced from the lower lake until MFWP restocks the lake the following year after the last rotenone treatment. See Comment 5c for impacts to birds.

The project area is within the historic range of the Coeur d' Alene salamander. The habitat requirement for this species includes splash zones of alpine waterfalls above 4,000-ft elevation. The Montana Natural Heritage Program lists this species as a XX, meaning that it is considered a sensitive species due to low abundance or limited information. No Coeur d' Alene salamanders have been observed or reported in the project area. However, the section of Boulder Creek approximately 1.7 miles upstream from Lake Koocanusa may provide suitable habitat for this species. See Comment 5c for impacts to amphibians.

On May 14, 2009, MFWP contacted the US Fish and Wildlife Service to determine if formal consultation with the US Fish and Wildlife Service was needed regarding impacts to threatened and endangered species within the project area. MFWP determined that there would be "no effect" to threatened and endangered species. The US Fish and Wildlife Service concurred with our opinion.

Comment 5g. This project will utilize a helicopter to transport the CFT Legumine, boat, and motor to Lower Boulder Lake, and several MFWP personnel will be working throughout the watershed during the implementation of this project. The most intense human activity at the lakes and throughout the stream corridor will occur during the rotenone application and should last 2-4 days. During this period, the human activity will likely be higher than these areas receive during most times of the year. However, these activities are not expected to negatively impact wildlife.

Comment 5i. MFWP will restock Lower Boulder Lake and Boulder Creek with westslope cutthroat trout (see Comment 5d).

B. HUMAN ENVIRONMENT

6. NOISE/ELECTRICAL EFFECTS **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Increases in existing noise levels?			X			6a
b. Exposure of people to severe or nuisance noise levels?		X				
c. Creation of electrostatic or electromagnetic effects that could be detrimental to human health or property?		X				
d. Interference with radio or television reception and operation?		X				

Comment 6a: The Boulder Creek watershed is located in a relatively remote area, which receives somewhat limited use from the public. Boulder Lakes do receive moderate-to-low use by recreation users during the period when this project will be implemented. This project will generate noise at and near the lakes from the helicopter used to transport materials to the lakes and from the boat motor used to distribute the rotenone product. MFWP will also use a small generator to power the potassium permanganate delivery device, which will generate some noise near where USFS Road 228 crosses Boulder Creek. The noise generated during these activities would be short term and minor.

7. LAND USE **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of or interference with the productivity or profitability of the existing land use of an area?		X				
b. Conflict with a designated natural area or area of unusual scientific or educational importance?		X				
c. Conflict with any existing land use, the presence of which would constrain or potentially prohibit the proposed action?		X				
d. Adverse effects on or relocation of residences?		X				

8. <u>RISK/HEALTH</u> <u>HAZARDS</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Risk of an explosion or release of hazardous substances (including, but not limited to oil, pesticides, chemicals, or radiation) in the event of an accident or other forms of disruption?			X		YES	8a
b. Affect an existing emergency response or emergency evacuation plan or create a need for a new plan?			X		YES	8b
c. Creation of any human health hazard or potential hazard?			X		YES	See 8ac
d. Will any chemical toxicants be used?			X		YES	See 8a

Comment 8a: The principal risk of human exposure to hazardous materials from this project would be limited to the applicators. All applicators would wear safety equipment required by the product labels and MSDS sheets such as respirator, goggles, rubber boots, Tyvek overalls, and Nitrile gloves. All applicators would be trained on the safe handling and application of the piscicide and potassium permanganate. At least one, and most likely several, Montana Department of Agriculture-certified pesticide applicators would supervise and administer the project. Materials would be transported, handled, applied, and stored according to the label specifications to reduce the probability of human exposure or spill.

Comment 8b: MFWP requires a treatment plan for rotenone projects. This plan addresses many aspects of safety for people who are on the implementation team, such as establishing a clear chain of command, training, delegation and assignment of responsibility, clear lines of communication between members, spill contingency plan, first aid, emergency responder information, personal protective equipment, monitoring, and quality control, among others. Implementing this project should not have any impact on existing emergency plans. Because an implementation plan has been developed by MFWP, the risk of emergency response is minimal and any effects to existing emergency responders would be short term and minor.

Comment 8c: The EPA (2007) conducted an analysis of the human health risks for rotenone and concluded it has a high acute toxicity for both oral and inhalation routes, but has a low acute toxicity for dermal route of exposure. It is not an eye or skin irritant nor a skin sensitizer. The EPA could not provide a quantitative assessment of potentially critical effect on neurotoxicity risks to rotenone users, so a number of uncertainty factors were assigned to the rating values. They are: an additional 10x database uncertainty factor, in addition to the interspecies (10x) uncertainty factor and intraspecies (10x) uncertainty factor, has been applied to protect against potential human health effects, and the target margin of exposure (MOE) is 1,000. The following table summarizes the EPA toxicological endpoints of rotenone (from EPA 2007):

Exposure Scenario	Dose Used in Risk Assessment, Uncertainty Factor (UF)	Level of Concern for Risk Assessment	Study and Toxicological Effects
Acute Dietary (females 13-49)	NOAEL = 15 mg/kg/day UF = 1000 aRfD = $\frac{15 \text{ mg/kg/day}}{1000}$ = 0.015 mg/kg/day	Acute PAD = 0.015 mg/kg/day	Developmental toxicity study in mouse (MRID 00141707, 00145049) LOAEL = 24 mg/kg/day based on increased resorptions
Acute Dietary (all populations)	An appropriate endpoint attributable to a single dose was not identified in the available studies, including the developmental toxicity studies.		
Chronic Dietary (all populations)	NOAEL = 0.375 mg/kg/day UF = 1000 cRfD = $\frac{0.375 \text{ mg/kg/day}}{1000}$ = 0.0004 mg/kg/day	Chronic PAD = 0.0004 mg/kg/day	Chronic/oncogenicity study in rat (MRID 00156739, 41657101) LOAEL = 1.9 mg/kg/day based on decreased body weight and food consumption in both males and females
Incidental Oral Short-term (1-30 days) Intermediate-term (1-6 months)	NOAEL = 0.5 mg/kg/day	Residential MOE = 1000	Reproductive toxicity study in rat (MRID 00141408) LOAEL = 2.4/3.0 mg/kg/day [M/F] based on decreased parental (male and female) body weight and body weight gain
Dermal Short-, Intermediate-, and Long-Term	NOAEL = 0.5 mg/kg/day 10% dermal absorption factor	Residential MOE = 1000 Worker MOE = 1000	Reproductive toxicity study in rat (MRID 00141408) LOAEL = 2.4/3.0 mg/kg/day
Inhalation Short-term (1-30 days) Intermediate-term (1-6 months)	NOAEL = 0.5 mg/kg/day 100% inhalation absorption factor	Residential MOE = 1000 Worker MOE = 1000	[M/F] based on decreased parental (male and female) body weight and body weight gain
Cancer (oral, dermal, inhalation)	Classification; No evidence of carcinogenicity		

UF = uncertainty factor, NOAEL = no observed adverse effect level, LOAEL = lowest observed adverse effect level, aPAD = acute population adjusted dose, cPAD = chronic population adjusted does, RfD = reference dose, MOE = margin of exposure, NA = Not Applicable

Rotenolenoids are common degradation products found in the parent plant material used to make piscicidal forms of rotenone. The EPA (2007) concluded these degradation products are no more toxic than the active ingredient.

The EPA analysis of acute dietary risk for both food and drinking water concluded:

> *"…When rotenone is used in fish management applications, food exposure may occur when individuals catch and eat fish that either survived the treatment or were added to*

the water body (restocked) prior to complete degradation. Although exposure from this route is unlikely for the general U.S. population, some people might consume fish following a rotenone application. EPA used maximum residue values from a bioaccumulation study to estimate acute risk from consuming fish from treated water bodies. This estimate is considered conservative because the bioaccumulation study measured total residues in edible portions of fish including certain nonedible portions (skin, scales, and fins) where concentrations may be higher than edible portions (tissue) and the Agency assumed that 100% of fish consumption could come from rotenone-exposed fish. In addition, fish are able to detect rotenone's presence in water and, when possible, attempt to avoid the chemical by moving from the treatment area. Thus, for partial kill uses, surviving fish are likely those that have intentionally minimized exposure.

Acute exposure estimates for drinking water considered surface water only because rotenone is only applied directly to surface water and is not expected to reach groundwater. The estimated drinking water concentration (EDWC) used in dietary exposure estimates was 200 ppb, the solubility limit of rotenone. The drinking water risk assessment is conservative because it assumes water is consumed immediately after treatment with no degradation and no water treatment prior to consumption.

Acute dietary exposure estimates result in dietary risk below the Agency's level of concern. Generally, EPA is concerned when risk estimates exceed 100% of the acute population adjusted dose (aPAD). The exposure for the "females 13-49 years old" subgroup (0.1117 mg/kg/day) utilized 74% of the aPAD (0.015 mg/kg/day) at the 95th percentile (see Table 5). It is appropriate to consider the 95th percentile because the analysis is deterministic and unrefined. Measures implemented as a result of this RED will further minimize potential dietary exposure (see Section IV)..."

As for evaluating the human chronic risk from exposure to rotenone-treated water, the EPA acknowledges the four principal reasons for concluding there is a low risk: first, the rapid natural degradation of rotenone; second, using active detoxification measures by applicators such as potassium permanganate; next, properly following piscicide labels which prohibit the use near water intakes; and finally, proper signing, public notification or area closures which limit public exposure to rotenone-treated water.

As for recreational exposure, the EPA concludes no risk to adults who enter treated water following the application from dermal and incidental ingestion, but requires a waiting period of 3 days after a treatment before toddlers swim in treated water. The aggregate risk to human health from food, water, and swimming does not exceed the EPA level of concern (EPA 2007). Recreationists in the area would likely not be exposed to the treatments because a temporary closure would preclude many from being in the area. Proper warning through news releases, signing the project area, road closure, and administrative personnel in the project area should be adequate to keep unintended recreationists from being exposed to any treated waters. Dead fish would be collected and sunk in the lakes or removed from the site. Administering application in the fall of the year would further reduce exposure due to the relatively low number of users in this area.

Fisher (2007) conducted an analysis of the inert constituent ingredients found in the rotenone formulation of CFT Legumine for the California Department of Fish and Game. These inert ingredients are principally found in the emulsifying agent Fennodefo[99] which helps make the generally insoluble rotenone more soluble in water. The constituents were considered because of their known hazard status and not because of their concentrations in the Legumine formulation. Solvents such as xylene, trichloroethylene (TCE), and tetrachloroethylene are residue left over from the process of extracting rotenone from the root and can be found in some lots of Legumine. However, inconsistent detectability and low occurrence in other formulations that used the same extraction process were below the levels for human health and ecological risk. Solvents such as toluene, n-butylbenzene, 1,2,4 trimethylbenzene, and naphthalene are present in Legumine, and when used in other applications can be an inhalation risk. However, because of their low concentrations in this formulation, the human health risk is low. The remaining constituents, the fatty acid esters, resin acids, glycols, substituted benzenes, and 1-hexanol were likewise present, but either analyzed, calculated, or estimated to be below the human health risk levels when used in a typical fish eradication project.

Methyl pyrrolidone is also found in Legumine. It is known to have good solvency properties and is used to dissolve a wide range of compounds including resigns (rotenone). Analysis of Methyl pyrrolidone in Legumine showed it represents about 9% of the formulation (Fisher 2007). The analysis concluded regarding the constituent ingredients in Legumine:

> "…None of the constituents identified are considered persistent in the environment nor will they bioaccumulate. The trace benzenes identified in the solvent mixture of CFT Legumine™ will exhibit limited volatility and will rapidly degrade through photolytic and biological degradation mechanisms. The PEGs are highly soluble, have very low volatility, and are rapidly biodegraded within a matter of days. The fatty acids in the fatty acid ester mixture (Fennodefo99™) do not exhibit significant volatility, are virtually insoluble, and are readily biodegraded, although likely over a slightly longer period of time than the PEGs in the mixture. None of the new compounds identified exhibit persistence or are known to bioaccumulate. Under conditions that would favor groundwater exchange the highly soluble PEGs could feasibly transmit to groundwater, but the concentrations in the reservoir and the rapid biodegradation of these constituents makes this scenario extremely unlikely. Based upon a review of the physicalchemistry of the chemicals identified, MFWP concludes that they are rapidly biodegraded, hydrolyzed, and/or otherwise photolytically oxidized and that the chemicals pose no additional risk to human health or ecological receptors from those identified in the earlier analysis. None of the constituents identified appear to be at concentrations that suggest human health risks through water or ingestion exposure scenarios, and no relevant regulatory criteria are exceeded in estimated exposure concentrations…"

The Legumine MSDS states "…when working with an undiluted product in a confined space, use a nonpowered air-purifying respirator…and… air-purifying respirators do not protect workers in oxygen-deficient atmospheres…" It is not likely that workers would be handling Legumine in an oxygen-deficient space during normal use. However, to guard against this, proper ventilation and safety equipment would be used according to the label requirements.

The advantage of CFT Legumine over Prenfish is that it has less petroleum hydrocarbon solvents such as toluene, xylene, benzene, and naphthalene. By comparison, Prenfish has a strong chemical odor. CFT Legumine is virtually odor-free and performs almost identically to Prenfish.

In their description of how South American Indians prepare and apply *Timbó*, a rotenone parent plant, Teixeira et al. (1984) reported that the Indians extensively handled the plants during a mastication process and then swam in lagoons to distribute the plant pulp. No harmful effects were reported. It is important to note that the primitive method of applying rotenone from root does not involve a calculated target concentration, metering devices, or involve human health risk precautions as those involved with fisheries management programs.

9. <u>COMMUNITY IMPACT</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of the location, distribution, density, or growth rate of the human population of an area?		X				
b. Alteration of the social structure of a community?		X				
c. Alteration of the level or distribution of employment or community or personal income?		X				
d. Changes in industrial or commercial activity?		X				
e. Increased traffic hazards or effects on existing transportation facilities or patterns of movement of people and goods?		X				

10. <u>PUBLIC SERVICES/TAXES/UTILITIES</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Will the proposed action have an effect upon or result in a need for new or altered governmental services in any of the following areas: fire or police protection, schools, parks/recreational facilities, roads or other public maintenance, water supply, sewer or septic systems, solid waste disposal, health, or other governmental services? If any, specify: _______________		X				
b. Will the proposed action have an effect upon the local or state tax base and revenues?		X				
c. Will the proposed action result in a need for new facilities or substantial alterations of any of the following utilities: electric power, natural gas, other fuel supply or distribution systems, or communications?		X				
d. Will the proposed action result in increased used of any energy source?		X				
e. Define projected revenue sources		X				
f. Define projected maintenance costs		X				

11. <u>AESTHETICS/RECREATION</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of any scenic vista or creation of an aesthetically offensive site or effect that is open to public view?		X				
b. Alteration of the aesthetic character of a community or neighborhood?		X				
c. Alteration of the quality or quantity of recreational/tourism opportunities and settings?			X		yes	See 11c
d. Will any designated or proposed wild or scenic rivers, trails or wilderness areas be impacted? (Also see 11a, 11c)		X				

Comment 11c: This project's primary objective is to remove the hybridized Yellowstone cutthroat trout population in Lower Boulder Lake and Boulder Creek and replace the fish with westslope cutthroat trout. This treatment may require rotenone treatments occurring in two consecutive years. MFWP will restock these waters with westslope cutthroat trout ranging from eyed eggs to fry plants the season following the last rotenone treatment. This stocking strategy will not produce catchable (<6-inch) fish in either the lakes or creek for approximately 1-2 years after the last treatment. This situation may result in a loss of recreational opportunities for these waters. However, relatively few anglers fish Lower Boulder Lake and Boulder Creek each year. MFWP conducts annual statewide fishing pressure estimates, and a review of these estimates since 1993 found that Boulder Lake appeared only in the 2007 fishing pressure estimates, with an estimated 37 angler days per year. Boulder Creek was not listed in any of the statewide fishing estimates searched. Once the population of westslope cutthroat trout is reestablished, MFWP doesn't anticipate a change in the number of public recreating in this area. Therefore, based on this assessment, MFWP believes any loss of angling opportunities would be relatively short term and minor. Any impacts to aesthetics would be short term and minor and be directly associated with the actual treatment and immediate aftermath, including dead fish in the project area. A tourism report is not necessary to quantify these impacts.

The project as proposed may extend into September. The general archery mountain grouse and moose hunting seasons also open on various dates in September. The activity within the project area during project implementation may displace some animals sought for this type of hunting. However, MFWP anticipates that any impacts from this displacement would be short term and minor. The main access trail leading to Boulder Lakes would be closed during the treatment. This closure will be posted at the trailhead and in two local newspapers approximately 1-2 weeks prior to treatment.

12. CULTURAL/HISTORICAL RESOURCES **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Destruction or alteration of any site, structure, or object of prehistoric, historic, or paleontological importance?		X				
b. Physical change that would affect unique cultural values?		X				
c. Effects on existing religious or sacred uses of a site or area?		X				12c
d. Will the project affect historic or cultural resources?		X				

Comment 12c: The project site is located within the aboriginal range of the Confederated Salish and Kootenai Tribes of the Flathead Nation and the Kootenai Tribe of Idaho. In July 2009, cultural officers for these tribes were contacted. To date there have been no cultural or religious resources identified at the project site. There will be no ground breaking activities associated with this project and no known cultural or religious ceremonies proposed for the same time this project is proposed. There will be no impacts to historical, cultural, or religious values.

13. SUMMARY EVALUATION OF SIGNIFICANCE **Will the proposed action, considered as a whole:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Have impacts that are individually limited, but cumulatively considerable? (A project or program may result in impacts on two or more separate resources, which create a significant effect when considered together, or in total.)		X				
b. Involve potential risks or adverse effects, which are uncertain but extremely hazardous if they were to occur?		X				
c. Potentially conflict with the substantive requirements of any local, state, or federal law, regulation, standard, or formal plan?		X				
d. Establish a precedent or likelihood that future actions with significant environmental impacts will be proposed?		X				
e. Generate substantial debate or controversy about the nature of the impacts that would be created?	X	X			yes	13e
f. Is the project expected to have organized opposition or generate substantial public controversy? (Also see 13e)	X	X				13f
g. List any federal or state permits required.						13g

Comments 13e and f: The use of pesticides can generate controversy from some people. Public outreach and information programs can educate the public on the use of pesticides. It is not known if this project would have organized opposition.

On May 20, 2009, MFWP mailed a scoping letter to the Tobacco Valley Rod and Gun Club, the Yaak Rod and Gun Club, and the Kootenai Trout Club to request a survey of their membership or interested publics to learn about local sentiments about the proposed project. To date, MFWP received the only response from the Yaak Rod and Gun Club, which supported this project.

Comment 13g: The following permit would be required: DEQ 308 - Department of Environmental Quality (authorization for short-term exemption of surface water quality standards for the purpose of applying a fish toxicant). The department consulted with the Kootenai National Forest during the planning and development phases of this project. No special use permit is required by either agency.

PART III. ALTERNATIVES

Alternative 1 – No Action.

The no-action alternative would allow status quo management to continue, which would maintain the present angling quality and species diversity in Lower Boulder Lake and Boulder Creek. Westslope cutthroat trout would not be present in the Boulder Creek watershed. The fish species present in these waters would continue to be hybridized trout consisting of Yellowstone, westslope cutthroat, and rainbow trout. Implementation of this alternative would do little to conserve westslope cutthroat trout in the upper Kootenai drainage.

Alternative 2 – Rotenone removal of hybridized trout from Lower Boulder Lake and Boulder Creek and restocking with westslope cutthroat trout (Proposed Action).

The proposed action involves removing hybridized trout from Lower Boulder Lake and Boulder Creek downstream to an existing natural fish barrier located approximately 1.7 miles upstream from Koocanusa Reservoir. Afterward, the lake would be stocked with westslope cutthroat trout. Based on the characteristics of the lake and creek, MFWP anticipates that this project provides the highest probability of achieving the objective of expanding westslope cutthroat trout distribution and maintaining a long-term, sustainable recreational fishery in the lake and creek.

Alternative 3 – Mechanical removal of hybridized trout from the lakes and creek and restocking with westslope cutthroat trout.

This alternative would involve using a combination of gears to remove the unwanted fish from the lake and creek, including gill nets and/or trap nets to remove fish from the lake, electrofishing to remove fish from Boulder Creek, and then stocking trout to these waters.

Gill netting has been used successfully to remove unwanted fish from lakes. Bighorn Lake, a 5.2-acre lake located in Banff National Park in Alberta, Canada, was gillnetted from 1997 to 2000 to remove an unwanted population of brook trout (Parker et al. 2001). Over 10,000 net nights (1 net night = 1 net set overnight for at least 12 hours) were conducted over a 4-year period in Bighorn Lake to remove the population which totaled 261 fish. The researchers concluded that the removal of nonnative trout using gill nets was impractical for larger lakes (> 5 acres). In clear lakes, like Lower Boulder Lake, trout have the ability to become acclimated to the presence of gill nets and to avoid them. These researchers reported observing brook trout avoiding gill nets within about 2 hours of being set. It is reasonable to expect that the trout in Lower Boulder Lake would react similarly.

Knapp and Matthews (1998) reported that Maul Lake, a 3.9-acre lake in the Inyo National Forest in California, was gill netted from 1992 to 1994 to remove a population of brook trout. The population, which totaled 97 fish, was successfully removed with an effort of 108 net days. The researchers reported that following the removal of brook trout from Maul Lake it was mistakenly restocked with rainbow trout. Efforts to remove them using gill nets were implemented immediately. From 1994 through 1997, 4,562 net days were required to remove the 477 rainbow trout from the lake. These researchers reported that gill nets could be used as a viable alternative to chemical treatment. They acknowledged that the small size and shallow depth of Maul Lake were conditions that allowed a successful fish eradication using gill nets. Their criteria for successful fish removal using gill nets include lakes less than 3.9 surface acres, less than 19 feet deep, with little or no inflow or outflow to perpetuate reinvasion, and no natural reproduction. Although not tested, the maximum size of a lake that they felt could be depopulated using gill nets was 7.4 surface acres and 32 feet deep.

Deploying gill nets and traps requires frequent presence at the site to check and reset nets. There would be an incredible time commitment required to attempt this method of fish removal. Due to these considerations and expected incomplete results, this alternative has a low probability of meeting the objectives.

The Montana Bull Trout Scientific Group concluded that gill netting would not result in a complete removal of fish that compete with bull trout (MFWP 1996). Rather, they recommended that it be used as a suppression technique. In very specific circumstances this method could lead to total removal.

Electrofishing has been used to remove unwanted fish from streams with limited success. Numerous attempts have been made to remove unwanted fish using electrofishing, but this has occurred mostly in streams. MFWP conducted an electrofishing removal of brook trout from 6 km of stream above a barrier on Muskrat Creek (Shepard et al. 2001). Over a 4-year period, researchers electrofished 5,386 brook trout from this section and moved them below a barrier. After four years of the electrofishing effort, they concluded that the operation was not 100 percent effective and recommended that some type of fish toxin be used to permanently eliminate the brook trout from the study section.

Electrofishing small streams where using piscicides is not feasible has had mixed results. Moore et al. (1983) reported that electrofishing did not eliminate rainbow trout from a Tennessee stream, but helped reduce their numbers, which help native brook trout reestablish. Thompson and Rahel (1996) reported similar results using electrofishing for brook trout removals to aid native cutthroat trout in a Wyoming stream. Kulp and Moore (2000) reported that five removals were required to successfully eliminate rainbow trout from Mannis Branch Creek, Tennessee.

Shetter and Alexander (1970) reported there are a great number of studies available on the use of electrofishing to remove or reduce numbers of fish from streams.

The Montana Bull Trout Restoration Team evaluated electrofishing as a possible means to remove competing fish species to aid in bull trout recovery. The team concluded that electrofishing could be used to help suppress target species, but would not likely be successful in total removal (MFWP 1996).

These reports demonstrate that electrofishing can be successful in some instances, but requires an incredible amount of time, specific conditions for success, and several years. Numerous examples are provided to demonstrate that it can be ineffective also. For these reasons this alternative was eliminated from further consideration.

Alternative 4 – Stocking westslope cutthroat trout in the presence of the hybridized trout currently existing in Lower Boulder Lake and Boulder Creek.

This alternative involves stocking the lakes and creek with westslope cutthroat trout in the presence of the hybridized fish. The stocked hatchery fish would likely also hybridize with the existing naturally reproducing fish inhabiting the lakes and creek. While adding westslope cutthroat trout to the system may reduce the amount of admixture within the population, it is not likely to completely eliminate hybridized fish from these waters. The relatively large number of fish present in Boulder Creek and the relatively abundant spawning habitat in the creek likely reduce the potential for stocking large number of hatchery fish to "swamp" the existing hybridized population of trout in this system. This alternative would likely require a very aggressive stocking program and require stocking numbers of hatchery fish much higher than would be normally considered. Although this alternative may temporarily improve angling quality for trout in the lakes and creek, it would do little to conserve westslope cutthroat trout in the upper Kootenai watershed. Based on these considerations, this alternative has a low probability of meeting the objectives.

Alternative 5 – Use angling to reduce the number of hybridized fish in Lower Boulder Lake and Boulder Creek, and then restocking with westslope cutthroat trout.

MFWP has the authority under Commission rule to modify angling regulations for the purpose of removing unwanted fish from a lake or stream. Unfortunately, this method does not guarantee complete removal of all fish. There are a number of reasons why this method may not work, especially in a remote area like the Boulder Creek system. First, liberalizing bag limits does not guarantee every angler would keep all of the fish they catch primarily because of differences in value systems among anglers. Recreational angling has been shown to reduce the average size of fish and reduce population abundance. As the size and abundance of fish decrease, angler satisfaction tends to decrease also. For these reasons it may be difficult to attract anglers to a site for voluntary angling if angling quality is poor. Second, caring for large bounties of fish in remote locations further dissuades anglers from keeping every fish they catch. Next, very small fish are not vulnerable to angling and can require as much as two years to recruit into the fishery. During this time, adult fish have the opportunity to continue reproducing. Finally, anglers in remote, rugged country do not typically target streams, especially those with little or no trail access. Lifting bag limits on streams would not likely succeed in removing fish due to difficulty in access. The amount of time required for anglers to depress or remove all fish from a lake or stream would likely require many years to accomplish. For these reasons this method of fish removal was considered unreliable at achieving the objective of complete fish removal from lakes and streams and was eliminated from further analysis.

Prepared by : Jim Dunnigan, FWP Fisheries Biologist Date: July 24, 2009

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Comment period is 30 days, from July 28 through August 27, 2009. Comments must be received by 5:00 p.m., August 27, 2009.

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